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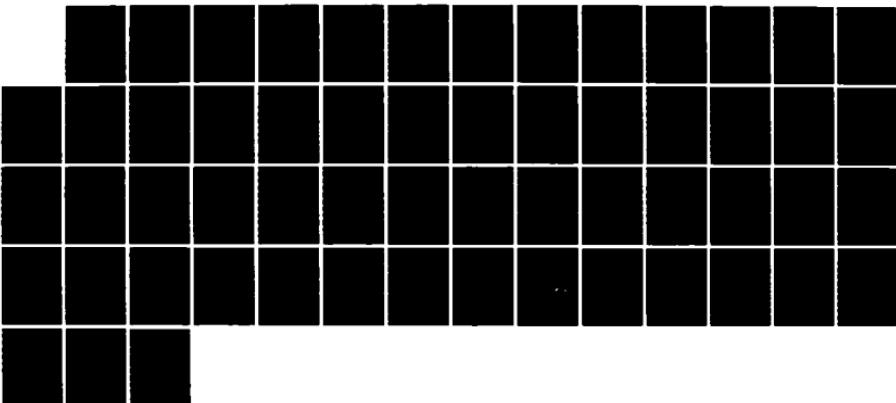
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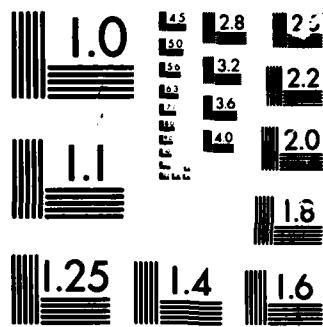
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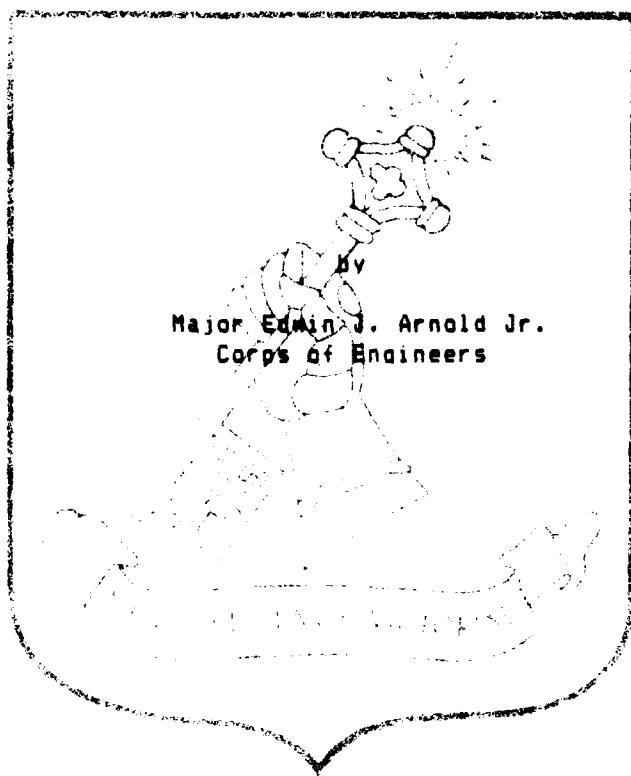
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AMERICAN RIVER CROSSING DOCTRINE:  
A Look at its Compatibility with  
Current Force Structure and the  
Modern Battlefield



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by  
**Major Edwin J. Arnold Jr.  
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## ABSTRACT

**AMERICAN RIVER CROSSING DOCTRINE: A Look at Its Compatibility with Current Force Structure and the Modern Battlefield.** by Major Edwin J. Arnold Jr. USA. 46 pages.

This study examines current river crossing doctrine to determine its compatibility with current force structure and the AirLand Battle concept of the modern battlefield. Using the historical example of the 80th Infantry Division's assault crossing of the Moselle River in September, 1944, the study identifies six factors which promoted successful river crossings in World War II. The validity of each factor is further supported with additional historical references. A comparison of 1939 and 1944 river crossing doctrine to current river crossing doctrine reveals the similarities between the doctrines. Current techniques and procedures are virtually identical to those of World War II.

This study demonstrates that the current doctrinal fixation with the crossing operation and the establishment of a secure bridgehead is not tactically sound. Analysis suggests that the doctrinal focus should be the defeat of the enemy's defenses in depth rather than the crossing or the bridgehead.

The study concludes with a look at U. S., Soviet, and German World War II river crossing practices and current Soviet practice to determine if some solutions to the doctrinal and force structures incompatibilities exist. Six changes, some to river crossing doctrine and some to force structure, are proposed.

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## I. INTRODUCTION

### Classical Perspective

In 207 BC, during the Second Punic War, Hasdrupal with an army of 40,000 men crossed the Alps into northern Italy. He was on his way to southern Italy to join his brother, Hannibal, to complete the destruction of Rome. Many historians believe that the combined forces of the two brothers would have been sufficient to cause the downfall of the Roman Empire. Fortunately for Rome, its two consuls, Livius and Nero, intercepted Hasdrupal and destroyed his army while Hannibal was still far to the south. This decisive battle was possible because the Romans trapped Hasdrupal's army on the south bank of the Metaurus River. He was unable to cross and had to turn to give battle.(1) Thus, a river crossing, or more correctly, the failure to cross a river, provided a decisive turn in the course of history.

Throughout the history of warfare river crossings have required special consideration by both attackers and defenders. In the one case, the attacker must determine how successfully to cross his force to continue his conquest; while in the other, the defender must determine how to use the river's defensive attributes to prevent the crossing. When armies were foot and horse mobile, most armies used feints and deceptions to insure that their river crossings were unopposed. With the advent of mechanization, the ability of the defender to move forces to the point of crossing increased greatly. Therefore, armies had to develop doctrines that described how to cross rivers successfully even though opposed initially or attacked while the force was split astride the river.

### Modern Perspective

In the modern era, the problem of crossing rivers has increased even more. The large heavy machines of modern war -- tanks, infantry fighting vehicles, and self-propelled artillery -- require bridges for crossing rivers. At the same time these machines give defending armies the capability to mass forces rapidly against river crossing attempts and to defeat the attempts at their most vulnerable time. The problem is, therefore, one of getting more combat assets across a river than the enemy can mass against the crossing. A country's river crossing doctrine, river crossing techniques, and available force structure must provide the solution to this problem.

### United States Perspective

River crossing doctrine, techniques, and available force structure for the United States Army do not adequately address the problem stated above. The concept of the bridgehead and the phasing of river crossing operations do not provide the proper defeat mechanism for the most likely opponents of U. S. river crossing attempts. Additionally, the current available force structure does not contain sufficient quantities of the assets that history shows are the key elements for successful river crossings using the current river crossing doctrine.

This paper will examine the areas mentioned above and will demonstrate the problems with current U. S. Army river crossing doctrine. A description of a division river crossing operation from World War II will provide the basis for analysis as well as suggest criteria of success for river crossings. A discussion of the development of U. S. doctrine will follow the historical example and will prepare the way for assessing the doctrinal dilemma of the present day. Next, the analysis portion of the paper will discuss how current doctrine is problematical. The analysis will

continue by examining how the U. S. Army force structure has changed since World War II and has become incompatible with the doctrine. Finally, a re-evaluation of some of the factors of success from World War II river crossings will provide possible approaches to the doctrinal dilemma facing the U. S. Army. The paper will conclude with several considerations for improving our river crossing capability.

### III. HISTORICAL EXAMPLE

#### Applicability

The best method with which to evaluate current U. S. Army river crossing capability is to analyze the several characteristics of the doctrine and the related force structure within the context of a historical example. World War II provides many such examples which are still pertinent today. Although the U. S. Army battle doctrine and force structure has changed since World War II, the doctrine for river crossings has not. Equally important is the fact that opposition doctrine in World War II was very similar to current opposition doctrine. Because of this, World War II river crossing operations provide excellent sources from which to draw conclusions about the U. S. Army's current ability to conduct river crossings.

There were many river crossings during World War II. Of the several possibilities, the 80th Infantry Division crossing of the Moselle River during the period 5-16 September 1944 provides a good example for study.(2) In this instance, the river crossing was made against a reasonably well defended section of the river. Additionally, the Moselle River represented a substantial obstacle to the advancing U. S. forces. The crossing required bridging assets through most of the zone even though some fords were present. The first attempts of the 80th Division to cross the Moselle River failed badly. Even on the final, successful crossing attempt, the success of the crossing hung in a delicate balance between success and failure as the German defenders counterattacked the crossing. The initial failure by the division shows the effect of not properly applying the correct procedures and assets to the crossing while the eventual success of the crossing demonstrates the positive effects of changing some procedures

and increasing support. For these reasons, analysis of this crossing should provide a good indication of the measures of success for river crossings and insight into the workability of the concept of the bridgehead against Warsaw Pact forces.

#### The Action

The initial XII U. S. Corps plans to cross the Moselle River in September 1944 called for the 80th Infantry Division, made up of the 317th, 318th, and 319th Infantry Regiments, to lead the assault. The 317th Infantry Regiment was to secure a bridgehead in the vicinity of Pont-a-Mousson as part of a reconnaissance-in-force. The other two regiments, the 318th and the 319th, were to attack across the river farther to the south at Belleville-Marbache and Toul, respectively (Map 1). The 317th led the attack on 4 September 1944 along the Flirey-Pont-a-Mousson road. Unknown to the advancing Americans, German defenders were watching the American column from the German defensive positions on Mousson Hill (382), Ste Genevieve (382), and the Falaise (373). When the 317th arrived at the river, scout patrols under the cover of darkness located three possible crossing sites. Rather than risk an immediate night crossing, the regimental commander decided to delay the attack until 0930 on 5 September 1944, and conduct a daylight attack. The regimental commander expected air support during the assault and believed that the 80th Division artillery would fire concentrations on his battalions' objectives in conjunction with the assault. Neither of these supporting fires actually was to be available during the assault.

The morning of 5 September dawned bright and clear as the two lead battalions, 1/317th and 2/317th, started their assaults while 3/317th waited in reserve. Only one battalion of artillery, the 313th Field Artillery Battalion in direct support of 1/317th Infantry, fired during the artillery

preparation. As the lead battalions moved to their attack positions, heavy enemy artillery, machine gun, and mortar fires fell on their positions and totally thwarted their attempts to cross the river. With this first attempt to cross the Moselle River a failure, the 317th regrouped. On the night of 5 September, the regiment tried again. In this attempt, all three battalions of the regiment attacked simultaneously. Again, machine gun and mortar fire drove the two flank battalions from the river's edge. In the center, engineer-manned assault boats ferried four platoons of infantry, 160 officers and men, across the river before heavy enemy fire stopped the operation. The infantry dug in to defend what ground they held on the east bank. The Germans counterattacked and eliminated the position. The 317th Infantry Regiment made no further attempts to cross the Moselle River at this location.

During these two unsuccessful attempts at crossing the Moselle River, the 317th Infantry Regiment had failed to apply certain characteristics of river crossings that often led to success. The regiment made no attempt at trying to gain surprise by deceiving the enemy. Believing the far bank to be weakly defended, the regimental commander did not think deception efforts were necessary. The failure to conduct active reconnaissance of the enemy bank led to this false perception of the enemy's defensive position. In addition, the firepower support provided to the 317th Infantry Regiment was very small relative to the firepower generated by the German defenders. Finally, the attempts to cross the river never wrested the initiative from the defenders. Even though some elements of the regiment landed on the enemy bank of the river and established a position there, the regiment could not provide additional support to them. The Germans were able to mass sufficient forces to counterattack the position and eliminate it. The 80th

Division learned from these failures as the later crossing attempt showed.

Farther south, the 318th Infantry Regiment and the 319th Infantry Regiment were also advancing toward the Moselle River. The 318th encountered stiff enemy resistance on the west side of the Moselle River and sustained heavy casualties trying to force the German troops to withdraw across the river. The 319th met less resistance initially and was able to achieve a crossing over the Moselle River at Toul. However, German defenses in two old French forts, Gondreville and the more strongly held Fort Viley-le-Sec, stopped the advance of the 319th until 10 September. On that day, the defenders of Fort Viley-le-Sec withdrew and 3/319th occupied the fort.

The 80th Division made no more advances until 12 September. By this time, the 35th Infantry Division and Combat Command B, 4th Armored Division had achieved crossings south of Nancy and XX Corps had forced a crossing over the Moselle River just north of the XII Corps sector. The 80th Division plan again had the 317th Infantry Regiment leading the assault, this time near Dieulouard. The initial objectives for the assault were la Cote Pelee, the heights at Ste. Genevieve, and the heights east of Bezaumont. With the bridgehead thus secured, two battalions of the 318th Infantry Regiment would cross into the bridgehead to capture Mousson Hill. At that time, engineers would install heavy bridges. When the bridges were completed, Combat Command A, 4th Armored Division, reinforced with a battalion of the 318th, now motorized, would enter the bridgehead to exploit the crossing.

Preparations for the attack were made to insure the largest degree of tactical surprise possible. Except for a series of patrols on 8 September to establish crossing sites, no patrolling occurred in the zone. There were no vehicular or troop movements into the 317th's sector. The supporting

artillery for the crossing attempt fired daily concentrations at all targets that were to receive heavy fires during the crossing attempt. These security efforts were apparently successful because the defenders did not alert on the artillery preparation or move reserves into the attack sector.

At 0400, 12 September, the first assault waves of 2/317th and 3/317th started crossing the river. "Nine battalions of field artillery opened fire on the road south of Loisy, and fifty machineguns emplaced on the Bois de Cuise during previous nights and manned by engineers put a curtain of fire over the assault wave. Thirty rounds of white phosphorous set the town of Bezaumont ablaze and provided a marker to guide the infantry advance."(3) Against light German resistance, the attack proceeded well and 1/317th followed 2/317th across the river. Before 1200, the 317th Infantry had secured all of its initial objectives and held a partially consolidated bridgehead of about 3000 yards.

Bridgehead development continued to proceed on or ahead of schedule. Two battalions of the 318th Infantry Regiment moved across the river about 1200 as the bridgehead reserve. They further supplemented the defense by establishing roadblocks at Autreville-sur-Moselle, Loisy, and Ville-au-Val. Because resistance had been light and in spite of continuous enemy artillery fire, engineers came forward and started construction of heavy bridges across the river and canals.(4) As the first day of the attack ended, the engineers completed the bridges. This allowed two companies of the 702d Tank Battalion, the 313th Field Artillery Battalion, some anti-tank guns, and a few towed tank destroyers to cross into the bridgehead by 2400, 12 September.

Shortly after sunset, German artillery and mortars started placing sustained fire on the bridgehead. By 0100 13 September, the artillery and

mortar fire was supplemented by ground counterattacks (Map 2). First, a battalion of German infantry reinforced with ten assault guns attacked the roadblock at Loisy and pushed it back. This attack was followed by the main counterattack which consisted of two battalions of infantry reinforced with fifteen tanks. The main counterattack successfully recaptured Ste. Genevieve and Bezaumont and drove the defenders from 1/317th and 2/317th into the reserve positions of the 318th causing some confusion. The two German counterattack forces then linked up and began a drive toward the American-held bridges. Resistance by American forces was barely possible as the intermingled forces of the 317th and 318th fell back to the river. Officers gathered small groups of men about them in the darkness to try to defend. At the bridge, confusion was immense. Vehicles crossing into the bridgehead ran into the mass of vehicles falling back. About 0500, a group of American infantry conducted a suicidal defense from roadside ditches south of Loisy that briefly halted the counterattack. This delay allowed the 2/318th to link up with B/702d Tank Battalion at le Pont de Mons and to establish a defense. The defense stopped the counterattack at that point but not without fierce fighting. The Germans were unable to reach the bridges. However, at one time they got as close as 100 yards from the bridge when they were finally checked by engineers and anti-aircraft gunners who were defending the bridges. (5)

Continued organized defense by the Germans was prevented by the actions of the Corps Commander, Major General Eddy. As the exploitation force for the river crossing, Combat Command A (CCA), 4th Armored Division had been moving toward the bridgehead since the completion of the heavy bridges and was in position to cross the river about 0600, 13 September. At that time, the German counterattack had reduced the bridgehead to such an extent that there was almost no maneuver room for the armor in the bridgehead and that

any crossing by CCA involved high risk. General Eddy, however, approved the crossing and CCA moved into the threatened bridgehead. The armor punch destroyed the remnants of the German counterattack. The lead battalion of CCA, 37th Tank Battalion, rolled along the road network away from the bridge knocking out road blocks, tank detachments, and anti-aircraft gun emplacements as it went. During the day the battalion covered twenty miles and suffered only twelve killed and sixteen wounded. Meanwhile, it captured 354 Germans and destroyed twelve tanks, eighty-five other vehicles, and five large caliber guns. There was no confirmed count of the number of German dead and wounded but it must have been high. Following the impetus of this attack by CCA, elements of the 80th Division attacked and restored the original bridgehead line by late afternoon, 13 September.

The next day, CCA moved out of the bridgehead area in an attempt to link up with CCB, 4th Armored Division coming from the south to complete the encirclement of Nancy. However, German defenders around the bridgehead were not finished. On 14 September, small German detachments conducted a series of counterattacks against the bridgehead but made no substantial gains. The attacks did require the Americans to use every available rifleman to secure the bridgehead. Measures such as this were not always enough. At Loisy, a particularly determined German counterattack was successful in capturing the town. Point blank firing by the 105mm howitzers of the 318th Infantry Cannon Company finally stopped the German counterattack. As the day ended, American forces had successfully defended the bridgehead but the Germans had received considerable reinforcements.

About dawn on 15 September, an intense artillery and mortar concentration signalled the start of another series of counterattacks. In the north, the Germans employed about five battalions of infantry and in the

south they had about four battalions. The two forces had approximately thirty-five tanks and assault guns split between them. Initially, the counterattack forces made solid advances into the American defenses. In the south, they drove 3/317th back about 1000 yards while in the north German forces took Atton from 2/318th and pushed forward toward Loisy. After these gains, American artillery support and reserves entered the battle. Four battalions of field artillery fired into the German thrust against 3/317th and broke the counterattack. A battalion of the 319th crossed into the bridgehead to help contain the thrust toward Loisy. In the center of the bridgehead line, Ste. Genevieve Ridge, the fight was especially fierce. The two U. S. battalions in the sector, 1/317th and 2/317th, were able to hold the very defensible terrain with some timely support from tank destroyers, artillery, and aircraft. Supporting 155mm gun battalions west of the Moselle River and fighter-bombers of the XIX Tactical Air Corps broke up the last counterattack against Ste. Genevieve as it was forming. On 16 September, the counterattacks continued but the American forces held their ground. At every point where a collapse appeared imminent, timely help would arrive in the form of artillery support, tank support, air support, or additional infantry. General Eddy sent 1/318th with a company of tanks back from CCA/4th Armored Division to reinforce the bridgehead. This force, as it moved into the area from the east, was able to catch and defeat several German units as they formed counterattacks. The final counterattack met failure as eleven P-51's came over to bomb and strafe the attack and the 80th Division artillery pounded the survivors. Late on 16 September, the remaining two battalions of the 319th entered the bridgehead as an infantry reserve. The Germans had failed in their attempt to eliminate the bridgehead even though they had come very close several times during the fight.

## Assessment

The 80th Infantry Division crossing of the Moselle River had six factors upon which the success of the river crossing depended. These six factors were:

- 1) tactical surprise through deception and security measures,
- 2) abundant fire support,
- 3) overwhelming air superiority,
- 4) large numbers of infantry soldiers,
- 5) piecemeal counterattacks by the defenders, and
- 6) bridge construction early in the operation.

The importance of each of these factors is clearly shown in the discussion presented above. Also, other river crossings throughout World War II demonstrated how the application of these factors led to success or, just as importantly, how the failure of application of one or more of the factors led to defeat. The following paragraphs will discuss each of the six factors in more detail.

The two separate attempts by the 80th Division to cross the Moselle River, first on 6 September and then on 12 September, demonstrate the importance of tactical surprise through deception and security. In the first attempt, the 317th Infantry Regiment made no effort to deceive the enemy about the assault, relying on its speed of movement to the river for surprise. The result was total failure. With this lesson learned, the division took greater security precautions with the second attempt and was able to achieve success by crossing the river in a lightly-held sector of the front. Other river crossings also used deception effectively. When the 35th Infantry Division crossed the Moselle River south of the 80th Division, the artillery support fired "for over an hour north of the 137th Infantry crossing site." (6) North of the 80th Division, when the 5th Infantry Division tried to secure a bridgehead across the Moselle River for the XX Corps, the 10th Infantry Regiment used the diversion caused by the 11th

Infantry Regiment's crossing at Dornot to achieve surprise in its crossing at Arnaville.(7) In each case when a crossing achieved surprise the assault forces were able to cross the river with limited casualties and to achieve some defensive organization before counterattacks struck.

Another aspect that characterized the eventually successful crossing by the 80th Division and most other successful river crossings was the preponderance of fire support. Conversely, a lack of fire support characterized unsuccessful river crossing attempts. In the first attempt by the 80th Division to cross the Moselle River, the 317th Infantry Regiment received fire support only from its direct support artillery battalion. The attempt failed. No large amounts of artillery were available for the second assault of the 317th which also failed. The successful attack on 12 September received a great deal of fire support. Nine battalions of field artillery and fifty machine guns supported the initial assault by 2/317th and 3/317th. Furthermore, as the battle raged for the bridgehead, fire support was essential for stopping several counterattacks. Fire support also played an essential part in the assault of the 30th Infantry Division across the Vire River. Eight artillery battalions, a chemical battalion, and a tank destroyer battalion all provided indirect fire support to the two assault regiments.(8) In addition to the feint fired by the artillery during the 35th Infantry Division's crossing of the Moselle River, the entire division artillery of the 35th Division and the heavy guns of XII Corps fired in support of the 137th Infantry Regiment's assault.(9) In each of these instances, fire support was an essential ingredient in both the initial assault and the retention of the bridgehead.

Closely related to the preponderance of fire support was the air supremacy enjoyed by American forces in World War II. Though air assets

were not instrumental in aiding the initial assault, they were important as the battle for the bridgehead developed. Airstrikes broke up at least two major counterattacks into the 80th Division's bridgehead. Equally important was the part played by aerial observers as they directed artillery fire and, in one case, delivered medical supplies to surrounded troops holding a key terrain feature.(10) In support of the Arnaville bridgehead of the 5th Infantry Division, air support destroyed ten German tanks and assault guns, the destruction of which greatly curtailed counterattack activity in that sector. In addition, aircraft were very effective in "bombing and strafing Arry and Orney, breaking up German formations as they moved up to attack positions,"(11) and by supplying fire support when artillery rounds were running in short supply.

Even with the preponderance of fire support and air superiority, U. S. forces still had to occupy and hold ground to make the river crossings successful. This burden fell to the infantry soldiers that spearheaded each assault except in rare cases where rivers were easily fordable by tanks. Infantry regiments were able to project their combat power across rivers fairly rapidly using assault boats, footbridges, or fording sites. Once across, the infantry could secure terrain objectives and hold the bridgehead line until exploiting forces could cross. Because the lead units usually crossed the river without tanks, artillery, tank destroyers, or other heavy fire weapons, they would receive large numbers of casualties during armor-led enemy counterattacks. However, the infantry formations had sufficient numbers of infantry soldiers that they could sustain the fight even when subjected to high numbers of casualties. Even after four days of intense fighting in the 80th Division bridgehead, the infantry regiments were able to hold despite receiving a large portion of the 2,851 casualties that the division received in September, 1944.(12)

The next factor of success was not a U. S. force action or force structure characteristic but was indirectly attributable to the actions of U. S. forces. As the Germans launched the series of counterattacks against the bridgehead, they seemed to throw forces into the battle as they arrived on the scene. The German First Army commander, General Knobelsdorff, was intent on crushing the bridgehead and ruthlessly weakened sectors of the front to get reinforcements for the bridgehead sector. By the time he finished gathering troops, he had accumulated almost a division equivalent. The reinforcements did not all get to the bridgehead simultaneously. Before any of the reinforcements reached the defending forces, Combat Command A, 4th Armored Division had broken through the bridgehead and was threatening the continuity of the defense. In his fear of the collapse of the entire defense, "General Hecker, the 3d Panzer Grenadier Division commander did not wait for the concentration of units being hurried to his sector but instead began a series of local counterattacks."(13) Judging from how close some of these piecemeal attacks came to achieving success, their concentrated force could quite possibly have eliminated the bridgehead.

The final factor of success occurred quite early in the battle for the bridgehead. Contrary to published doctrine, the corps commander ordered the construction of heavy bridges shortly after the assault started. This order and the subsequent bridge construction insured the survival of the bridgehead. Because the bridges were in place by the night of 12 September, tanks, artillery, and tank destroyers were across the river at le Pont de Mons when the first main German counterattack reached that point. These vehicles were instrumental in stopping the counterattack. Subsequently, the completed bridge enabled the 37th Tank Battalion to cross the river and attack through the bridgehead to disrupt totally the German withdrawal from

the counterattack. In other river crossing operations, early construction of vehicular bridges, even though costly in terms of bridging assets, was important in the ultimate success of the crossing operation. During both the Vire River (14) and the Wurm River (15) crossings, engineers built bridges under enemy observation and artillery fire to allow the movement of vehicles into the bridgehead. On the other hand, when the 35th Infantry Division crossed the Moselle River south of Nancy, the Germans destroyed the captured bridge after 2/134th Infantry Regiment had crossed. With the regiment thus cut off and before a new bridge was built, the Germans counterattacked and inflicted heavy casualties on the unit.(16) Similarly, when four platoons of 3/317th Infantry Regiment crossed the Moselle River on the night of 5 September, reinforcements could not reach them because there was no bridge across the river. The four platoons were completely destroyed by a German counterattack. Thus, the early construction of bridges, even if the site was still under fire, was very important for the survival of the bridgehead.

### III. PROBLEM DEVELOPMENT

#### Defensive Framework

Any river crossing doctrine must consider how the opposing army is most likely to defend the river line. According to Clausewitz, there were two methods of riverline defense. In the first, the defending force deploys in strength along the riverline with few forces in depth. The intent of the defense is to deny the attacker any crossing whatsoever of the river. However, any successful crossing by the attacker generally unhinges the defense completely. The other defensive method relies more heavily on defense in depth for its success. Security forces screen the riverline to detect crossing attempts. The mobile reserves in depth move to the crossing site to attack the crossing force while the attacker's forces are astride the river.(17) Disruption of this type of defense requires the attacker to defeat the defensive forces in depth or to overwhelm the defense with multiple crossings. This latter form of defense seems to be the more favorable since Clausewitz later wrote that no river line defense was impregnable.(18)

#### 1939 Doctrine

In spite of the fact that the river line defense in depth appears to be the more favorable, U. S. Army river crossing doctrine, early in World War II, seemed to be directed against the shallower form of defense. The techniques developed to support the doctrine were directed at crossing the river rather than the defeat of the defending forces in depth, such as in the case of the 80th Infantry Division's crossing of the Moselle River. The key feature of early U. S. Army World War II doctrine was the establishment of a secure bridgehead, an area on the enemy side of the river

into which friendly forces could cross. The tentative Field Service Regulation 100-5, Operations, of 1939 said, "In a river crossing the principal objective is to gain the far side of the river as quickly as possible and establish a bridgehead which will protect the bridging operations and the crossing of the remainder of the command."(19) Thus, river crossing operations were an end in themselves and, as such, focused quite heavily on merely crossing the river and not defeating the enemy or continuing the operation.

Early World War II river crossing doctrine emphasized two things above all else: reconnaissance and deception. Staff and engineer officers were to start reconnaissance early in the operation using air photographs and maps. Ground reconnaissance supplemented the early efforts once friendly troops drove enemy forces across the river and secured the near bank. The primary aim of this preliminary reconnaissance was the identification of possible crossing sites. For this reason, the personnel conducting the reconnaissance were mainly interested in the hydraulic characteristics of the stream and the existence of previously-built crossing sites.(20) Furthermore, as planning for the crossing continued, assault elements also conducted reconnaissance. This additional reconnaissance was to be concentrated "not only on the crossing places of the bridgehead troops and the positions and preparation of fire of the supporting troops but also on the routes of approach, assembly positions of units, concealed distribution points of engineer material, and all preparatory measures preliminary to the execution of the crossing."(21) However, 1939 doctrine never required the use of reconnaissance, especially ground reconnaissance of the enemy shore, to determine the disposition of enemy forces. By failing to do so, the doctrine supported the importance of the river instead of the threat of the enemy.

The doctrine also stressed the need for deception and secrecy in river crossing operations. In the initial paragraph about attack of a river line, the manual stated that river defenses might be turned. It said that by demonstrations "an attempt is made to deceive the enemy as to the projected point of crossing while a strong mobile force makes an unopposed crossing elsewhere" (22) and turns the hostile flank. In another section the doctrine stated that "Feints or secondary crossings and demonstrations are frequently employed to divert the enemy's attention from the place where the principal crossing is to be effected and to induce him to divide his forces." (23) The doctrine was clear in its assertion that it was important to deceive the enemy about the actual time and place of the crossing attempt.

Procedurally, the doctrine required additional assets to move toward the river line during the early planning phase for the river crossing to support the crossing attempt. Artillery units occupied positions from which they could support both the assault crossing and the move from the exit bank to the bridgehead line. Anti-aircraft artillery positions protected the principal ferry and bridge sites. A large reserve of engineer troops, equipment, and materiel moved into a covered position near the river. There they waited until it was time to assist in assault boat operations or conduct ferry and bridge operations. The engineer reserve also provided a quick source for replacement of engineer losses, both men and materiel.

The remainder of the early World War II river crossing doctrine discussed the many considerations of a river crossing operation. A brief mention was made of trying to pre-empt an enemy riverline defense by attacking rapidly to secure existing bridges. Primarily, however, the focus

of the doctrine was on the forced crossing. The initial doctrinal consideration for river crossings was the selection of the points of crossing. There were several considerations for the selection of a crossing site. The presence of a good bridgehead position, one offering good defensible terrain from which friendly forces could cover the bridgehead, was an important aspect of the selection. Also of prime importance in the site selection process were covered approaches to the river on the friendly bank, rapid connections into the road net on the enemy shore, and dominating ground on the friendly side of the river.(24) The doctrine seemed to suggest that a particularly favorable location for crossing a river was a place where the river formed a salient toward the friendly forces. The disposition of defending forces was not mentioned as a criteria for site selection.

World War II river crossing doctrine further specified the procedures for crossing the river. After all preliminary planning and reconnaissance was complete, bridgehead assault troops crossed the river in assault boats or forded the river if conditions permitted. They made the assault on as broad a front as possible. Supporting troops such as artillery provided fire support for the assault. Engineer troops generally manned the assault boats to carry each successive assault wave across the river. When enough assault troops crossed the river, they would try to expand their positions to fill the designated bridgehead line. As the positions expanded, ferry operations transferred tanks, tank destroyers, and artillery from the friendly shore to the enemy shore to reinforce the assault. Further expansion of the position, to include capture of key terrain that dominated the bridge sites, allowed bridge construction to start. A completed bridge and secure bridgehead signalled the completion of the river crossing operation.

#### 1944 Doctrine

By 1944, U. S. Army river crossing doctrine had changed somewhat.

The revised doctrine reversed the idea that crossing the river was the end of the operation. Rather, it specifically stated that "the actual crossing is a means, not the end sought." (25) Additionally, timing considerations for the employment of bridging assets in relation to the progress of the assault forces appeared in the doctrine. The doctrine prescribed three successive objectives for the assaulting force: "first, a position which will eliminate effective, direct, small arms fire from the crossing front; second, a position which will eliminate ground observed artillery fire from the selected ponton bridge site(s) and which can be supported by light artillery on the attacker's side of the river; third, a position which will eliminate all artillery fire from the bridge site(s) and will provide the necessary maneuver space on the enemy side of the river for the command."

(26) As assault troops secured each of these objectives a different phase in the employment of bridging assets would start. Attainment of the first objective signalled the crossing of succeeding troops with assault boats, foot bridges, and ferries. After the assault secured objective two, normally bridge construction started, especially if some measure of local air superiority had been achieved. Finally, objective three marked the formal bridgehead line and provided for the unobstructed use of bridging assets in the zone.

In addition to these two major differences between the 1939 tentative doctrine and 1944 doctrine for river crossing operations, there were several lesser additions in the 1944 doctrine. First, there was a greater mention of air support for river crossing operations. The new doctrine required at least local air superiority for crossing operations. Closely associated

with the use of air support was the possibility of using airborne troops to secure bridges in the enemy's rear to prevent him from reinforcing riverline defenses and further isolating the crossing area. Also included in the 1944 doctrine was much more detail in two areas: how to move assault troops effectively from the assembly area to the river's edge and how to employ the various engineer assets (boats, foot bridges, and ponton bridges) effectively. The final change was an obscure addition to the list of favorable characteristics for crossing sites. The 1944 doctrinal manual said that a good crossing site might be an undefended stretch of the river.

(27) The enemy had finally made his way into U. S. Army crossing site considerations.

#### IV. ANALYSIS

##### Current Doctrine

Changes between 1944 river crossing doctrine and current river crossing doctrine are fewer than those that occurred between 1939 and 1944. Since 1944, the U. S. Army has devoted an entire manual, FM 90-13, to its river crossing doctrine and has formalized river crossings into three types:

- 1) hasty river crossing operations conducted during the continuation of an attack with little or no loss of momentum;
- 2) deliberate river crossings conducted after a halt to build up forces and crossing assets at the river obstacle; and
- 3) retrograde river crossings conducted to withdraw friendly forces away from advancing enemy forces. (28)

The 1944 river crossing doctrine did not mention retrograde crossings at all and only briefly mentioned hasty crossings (crossings of opportunity). It did, however, discuss deliberate or forced crossings. The biggest difference between the 1944 doctrinal discussion of most of the concepts, techniques, and procedures for river crossings and the current doctrinal discussion of the same material is the degree of detail with which current doctrine discusses the subject. A major difference exists in one area, threat analysis. Current doctrine specifies that a key element for the river crossing planner is knowledge of the enemy; his dispositions, his capabilities, and his intentions. Furthermore, current doctrine places some emphasis on selecting crossing sites that avoid strongly defended areas. The 1944 doctrine gave threat analysis only a minor mention and that was in relation to crossing site selection.

The fact that current doctrine has changed so little from 1944 doctrine has left the U. S. Army with a dilemma. Although current doctrine and 1944 doctrine both recognize that river crossings are but the means to achieve some greater end, possibly the defeat of the enemy in depth, the techniques and procedures are remnants of 1939 doctrine that did not see river crossing as the means for making the enemy's defeat possible but the end in themselves. Thus, the U. S. Army currently has a river crossing doctrine that recognizes the need for defeating opposing forces in depth but that uses techniques that reflect a shallow defeat mechanism. Furthermore, the most probable defenders against a U. S. Army river crossing operation, Warsaw Pact forces, appear to defend river lines with substantial forces in depth with which to counterattack crossing attempts. The consequences of this situation are fairly obvious. The U. S. Army concept of the bridgehead, as developed to support river crossings against shallow defenses, may be insufficient against defenses arrayed in depth. The counterattack forces that a defense in depth can place against a forming bridgehead are much greater than those that a shallow defense can generate. Consequently, either the forces in the bridgehead must be stronger to counter the threat or the concept of the bridgehead must change to incorporate a better defeat mechanism for the river defense in depth.

#### Doctrinal Problems

Problems exist with current U. S. Army river crossing operations because of an outdated doctrine and a force structure that is incompatible with the doctrine. The army has continued to use concepts and techniques that shaped operations in World War II. This doctrine for river crossings does not fit within the confines of AirLand Battle doctrine. With the doctrinal emphasis on securing the bridgehead line before exploitation of

the crossing, the attacker has a tendency to relinquish the initiative. For example, after the 80th Infantry Division successfully crossed the Moselle River, "the enemy had continued to hold the initiative, striking at his own chosen time and place." (29) The resulting battle under such circumstances became a form of attrition warfare with each side trying to exhaust the other. The defender can be most effective in this aim if he is able to mass forces sufficiently to sever the bridgehead's lifeline, the bridge. The attacker, on the other hand, must reinforce and hold the bridgehead in a static defense until the defender has exhausted his means to counterattack the bridgehead. Against the German Army in 1944 and 1945 such tactics were not altogether unwise since the German Army was already stretched thin and weakened by five years of war. However, a contemporary opponent like the Soviet Union or Warsaw Pact may be more capable of massing sufficient strength to crush a bridgehead as it sits on the river.

Another problem with the current doctrine is its lack of a defeat mechanism for the enemy's defense. With the doctrinal focus on the secure bridgehead, terrain features rather than forces become the objectives of the attack. The attack will unhinge the enemy's defensive framework only if the chosen terrain objectives are vital parts of the defense. If not, the defender could retain a coherent defense. In so doing, he will have the capability to employ his reserves in appropriately timed counterattacks to eliminate the bridgehead. Such was the case on 12 September 1944, when the 80th Infantry Division first crossed the Moselle River in force. At this early stage of the battle, the American forces had not yet threatened the defensive position of the Germans. Therefore, the Germans were able to launch a carefully planned and well-executed counterattack that nearly collapsed the bridgehead. Subsequently, after Combat Command A, 4th Armored Division passed through the bridgehead and started exploiting into the

depths of the defensive position, the German commander started rushing his reinforcements into the battle. These piecemeal counterattacks did not destroy the bridgehead but they did exhaust the available forces of the defense. Thus, even though the German commander still held the initiative in the battle, he felt threatened enough by the armored column that he did not take time to mass his forces sufficiently to achieve his objective of crushing the bridgehead.

Finally, the doctrinal concept for the timing of bridge construction in a river crossing operation is inadequate. In the World War II 1944 doctrine, raft construction was generally not to occur before assault had seized the first objective which supposedly eliminated direct fire onto the bridge site. Further, bridge construction had to wait until friendly troops seized the second objective which eliminated observed indirect fire. Current doctrine includes rafting operations early in the assault across the river but the 1944 doctrinal concept for bridge construction still exists.

(30) Rafts and bridges are virtually the only means by which tanks, artillery, and infantry fighting vehicles can effectively cross most rivers. By delaying the use of these crossing assets, the current ability of the U. S. Army to project combat power across a river declines. Therefore, against a fully mechanized opponent such as the Warsaw Pact, U. S. Army doctrine does not visualize massing forces across a river more quickly than the enemy can mass his forces to stop the attack. The result would be defeat.

#### Force Structure Problems

In addition to these doctrinal problems for river crossings, there are also some areas of incompatibility between the current force structure and current doctrine. The areas for discussion are infantry availability,

artillery support, air support, and bridging equipment availability.

Earlier discussions in the paper mentioned each of these areas as factors which led to the success of the 80th Infantry Division's crossing of the Moselle River in September, 1944. The problem that has developed is that these areas of the total force structure are less available now than they were during World War II. The consequences of such reductions may be the inability to perform river crossings effectively using current doctrine.

The current mechanized infantry division does not have the dismounted infantry strength required to conduct river crossing operations as current doctrine dictates. In World War II when the U. S. Army used virtually the same doctrine as today, infantry divisions were composed of three regiments, each having three battalions of about 600 men each. The total available ground combat strength of the division was approximately 5485 men.(31) Under the new J-series organization, the mechanized infantry squad contains only nine personnel, three of whom generally remain with their infantry fighting vehicle (IFV). (32) If the IFV does not cross the river with the assault force, a drastic reduction in the available combat power of the unit occurs. When the infantry must operate separately from their IFV's, the division has less than 1500 dismounted infantry available. The situation could be worse. For example, in a dismounted night infantry attack recently at the National Training Center (similar in that the infantry were away from the IFV's), two companies of infantry were able to muster only seventy-five personnel.(33) Comparison of that number with the 160 officers and men who were killed when only four platoons of the 3rd Battalion, 317th Infantry Regiment crossed the Moselle on 5 September 1944, shows the disparity between the numbers of infantry in World War II and now. The consequences of having fewer infantry soldiers available for dismounted infantry attacks across rivers are three: 1) another type of infantry unit or force must

lead the assault; 2) mechanized infantry units must always make assault crossings without abandoning their IFV's; or 3) the U. S. Army must adopt a different river crossing doctrine from the World War II attrition-type doctrine.

In the area of artillery support, the U. S. Army will most probably experience a reduction in available artillery support relative to the enemy's artillery support. In 1944, American artillery forces enjoyed quantitative and qualitative advantages over German artillery units. Against Warsaw Pact forces such advantages will probably not exist. Warsaw Pact forces have a substantial quantitative advantage over U. S. forces in the amount of available artillery and the quality of their artillery weapons is nearly the same as the quality of U. S. artillery weapons.(34) Thus, the ability of U. S. artillery forces to support assault river crossings in a manner similar to World War II seems unlikely. Massed artillery fires may be possible for the initial crossing and for some periods but not throughout the entire operation. The enemy will also be able to use artillery more effectively in trying to stop the attack thus slowing movement and bridging operations. The biggest setback to U. S. Army river crossings may come, however, when the enemy launches counterattacks supported by highly-concentrated artillery fires. Unlike World War II, when the 80th Infantry Division and the 35th Infantry Division were both able virtually to halt counterattacks with artillery fire, present day forces may have to survive an enemy artillery bombardment first and then stop the counterattack with their own assets. The end result of the changes in artillery support available to both U. S. forces and enemy forces is a relative decrease in the firepower advantage that U. S. forces obtained over German forces in World War II river crossing operations.

A very similar situation to the artillery support situation described above exists with relation to air support. The allies achieved almost total air supremacy by D-Day, 1944. Thus, close air support was an extremely valuable asset for the allies and represented a substantial fire support weapon for river crossing operations. As with artillery, close air support operations were quite effective in disrupting and even stopping German counterattacks into American bridgeheads. Additionally, air interdiction operations interfered with the movement of reinforcements to any active sectors of the front causing the reinforcing units to arrive at less than full combat strength.(35) Two factors will work together to decrease our advantage in this area in a future war with Warsaw Pact forces. First, overwhelming air superiority will not be possible for either combatant even though local air superiority, in time and place, may be possible. Second, modern armies, especially Warsaw Pact forces, possess a much more diversified and effective air defense capability than the armies of World War II possessed. As with artillery, these factors will result in a decrease in the firepower of the U. S. forces trying to cross the river relative to the firepower of the defender.

The final area of force structure changes since World War II that impacts unfavorably on U. S. river crossing doctrine is the availability of river crossing assets. Currently, the U. S. Army does not possess the quantity of river crossing assets that were available to U. S. forces in World War II.(36) Modern equipment is, however, much better qualitatively and requires less construction effort and time to emplace. These traits notwithstanding, the quantitative shortfall may lead to serious problems with assault river crossings. Current doctrine states that during river crossing operations, bridge construction must wait until assault forces have eliminated observed, indirect fire from the bridge site. World War II

doctrine stated the same restriction. However, one of the keys to success for the 80th Infantry Division on the Moselle River and the XIX Corps on the Wurm River was that the commanders, contrary to the doctrine of the time, ordered the bridges built while the sites were still under observation and were still receiving fire. The assault units were therefore able to cross tanks, artillery, and tank destroyers into the bridgehead to increase their combat strength on the opposite bank. Such actions contrary to doctrine were possible because enough bridging assets were available to replace the losses incurred because of the fire. Now, with replacement assets not so readily available, if available at all, commanders will be less likely to risk losing the vital bridging assets. The result will be a slower build-up of forces in the initial crossing area and a much longer period of vulnerability to enemy counterattacks.

The impact of these four changes (infantry forces availability, artillery support, air support, and crossing equipment) in the force structure since World War II on the current doctrine is immense. Current doctrine, as it has developed from the beginning of World War II until the present, requires a force structure advantage relative to the enemy similar to that which existed in 1944 if its practice is to lead to success. Even then, against a German Army that was stretched thin and weakened by five years of war, many of the successful river crossings came extremely close to failure. Others, like the Rapido River crossing by the 36th Infantry Division, which did not employ the factors of success demonstrated by the 80th Infantry Division's crossing of the Moselle River, failed dramatically.<sup>(37)</sup> The changes to the force structure discussed above coupled with the capabilities of the most likely opposition have reduced the relative force structure advantage existing in World War II. The result is

that the current force structure is incompatible with the current river crossing doctrine.

#### Approaches to Solutions

Minor problems exist within the doctrinal principles of every army. However, the problems that exist within the U. S. Army's river crossing doctrine are not minor problems and cannot go unresolved. The incompatibilities of the present force structure with the current doctrine further demand some type of change to the force structure, to doctrine, or both. The argument for increased assets in the force structure with which to continue forcing river crossings following current doctrinal techniques is generally unacceptable. So, the most readily available area for improvement is probably a change in doctrine to a new concept of river crossing techniques. However, the optimum solution to the problem may be a combination of some doctrinal change and some force structure modification. The factors of success from World War II river crossings provide a logical basis from which to derive possible solutions for the U. S. Army's doctrinal dilemma. The following paragraphs will examine several factors of success from World War II river crossings to determine if they have applicability to the problem.

In addition to the six factors of success identified from the 80th Infantry Division's crossing of the Moselle River in September, 1944, there are three other factors that seemed to promote success whenever they were employed in river crossing operations during World War II. The nine factors of success are:

1. abundant artillery support.
2. overwhelming air superiority.
3. numerous infantry soldiers.
4. early bridge construction.
5. piecemeal counterattacks.
6. active, comprehensive reconnaissance.
7. tactical surprise.

8. force-oriented objectives, and
9. "in-stride" river crossings.

Of these nine, not all will offer solutions to the doctrinal and force structure dilemmas that currently confront the U. S. Army. In fact, the inability of the current force structure, in relation to the enemy's capability, has led to the dilemma. Such is the case with abundant artillery support and overwhelming air superiority. Similarly, the current force structure impacts adversely on the Army's ability to provide numerous infantry soldiers for river crossing operations or to provide sufficient bridging assets to permit early bridge construction. However, unlike artillery support and air superiority which would require substantial increases in the force structure to return to World War II levels, the problems with availability of infantry soldiers and bridging assets would not require major force structure changes.

The remaining five factors of success offer varying degrees of relief for the current doctrinal dilemma. One of the five, piecemeal counterattacks, cannot provide a direct solution to the doctrinal dilemma since the counterattacks are not directly controlled by U. S. forces. However, aggressive actions by U. S. forces in the conduct of a river crossing can effectively disrupt a defense and threaten its entire framework, much the way the 37th Tank Battalion disrupted the German defense on the Moselle River. In so doing, the actions of U. S. forces may cause the enemy commander to react hastily to the situation and throw his counterattack forces into the battle in a piecemeal fashion, thereby diluting their effect. Thus, this factor for success may well provide a key for the development of a new concept for river crossing doctrine.

The next two factors of success, reconnaissance and surprise, are already included within current doctrine. They can improve the chances of

success if they are practiced actively and comprehensively. Even though current doctrine discusses both factors, it does not impart to them the importance they achieved during World War II. In those years, the Americans, Germans, and Soviets relied heavily on reconnaissance along both banks of the river (38) and surprise through deceptions, feints, and simulated attacks (39) to achieve success in crossing rivers. Increased emphasis on these two factors will improve our capability.

River crossings on the Eastern Front in World War II supplied one factor of success that was not seen on the Western Front. The concept of the river crossing's objective was different for the Soviet Army than for the German Army or the American Army. Both the German and American Armies designated terrain objectives across the river for the assault forces thereby making their attacks terrain-oriented. The Soviet Army not only did this, they further specified sectors of the enemy defense that had to be neutralized during the assault.(40) In so doing, their attacks were both terrain-oriented and force-oriented. By seeking the destruction of certain elements of the defender's force, the attacker was able to threaten the enemy's defense and possibly defeat the defense in depth. Such a concept as force-oriented assault river crossings could provide the mechanism whereby the attacker wrests the initiative from the defender with the initial assault and does not relinquish it throughout the operation.

The final factor of success is the idea of making river crossings "in-stride" with the advance. This technique was very beneficial to the XII Corps as it exploited across France until it reached the Moselle River where it stopped because of lack of fuel.(41) The intent of this factor was to cross rivers at the same time as defending troops tried to withdraw across the river thus precluding the use of the river as a defensive line. Both the Germans and Soviets used this technique in their advances on the Eastern

Front.(42) While the capture of existing bridges was a great aid to this type of crossing, the timely construction of bridges also insures the continued momentum of the attack and the continued disruption of the defense. If, however, the enemy was able to break contact and organize a sufficient riverline defense, other actions were required. In World War II, the alternate actions were similar to those used by the 80th Infantry Division as it crossed the Moselle River in September 1944. As shown in the previous discussion, those actions are either no longer possible or have a very low likelihood of success considering the current U. S. Army force structure against its most likely opponent, the Warsaw Pact.

## V. CONCLUSIONS

Current U. S. Army river crossing doctrine which is based on the concept of the secure bridgehead is not achievable within the current force structure. The current doctrine is virtually the same as the river crossing doctrine that existed at the end of World War II and is incompatible with the army's AirLand Battle doctrine. The techniques prescribed by current doctrine reflect the techniques of World War II and tend to force river crossings into attrition warfare. The U. S. Army no longer has the force potential relative to its most likely adversary, the Warsaw Pact, to conduct attrition warfare and win. Therefore, changes are necessary. The factors of success from World War II river crossing attempts can provide possible solutions to the doctrinal dilemma with which the U. S. Army is now faced. The following six changes, based on the previous discussion, are my conclusions for changes that will improve current U. S. Army river crossing doctrine.

First, and foremost, the focus of U. S. Army river crossing doctrine must change from the crossing of the river and securing a bridgehead to the defeat of the enemy's defense in depth. Current river crossing doctrine says that crossing the river is not a tactical mission in itself. However, the doctrinal techniques and procedures stress the importance of securing the bridgehead. The effect of this emphasis is a tendency to secure bridgehead objectives and then consolidate gains. In so doing, any initiative gained by crossing the river is relinquished to the defender allowing him time to mass his forces for a counterattack to crush the bridgehead. On the other hand, crossing the river and pursuing the attack to defeat the enemy's defense maintains the initiative for the attacker. A thrust of the

attack into the depths of the defense will force the enemy to react in a hasty and possibly piecemeal manner to prevent the disintegration of his defensive framework. As the attacker uses speed and aggressiveness to disrupt the defense, he gains a degree of security by causing the defender to diffuse his counterattack power. Thus, by changing the focus of current river crossing doctrine, the U. S. Army may be able to offset some of the inadequacies.

Second, assault river crossings must change from terrain-oriented operations to either force-oriented operations or a combination of the two. This change is closely linked to the first change. By orienting the assault forces toward the destruction of defending enemy forces, U. S. Army river crossing doctrine will look past the crossing of the river to the defeat of the enemy. Furthermore, destruction of enemy forces will increase the anxieties of the enemy commander about the disintegration of his defense. He will become more reactive to the attacker's initiatives as described above and will diffuse his available combat power by piecemeal introduction of that power into the battle. Reorientation of assault river crossings from terrain objectives to force objectives will also negate the tendency of the attacker to relinquish the initiative as initial terrain objectives are achieved. The pursuit of force-oriented objectives will drive the attack into the depths of the enemy's defense and secure the initiative for the duration of the operation. This would eliminate a major shortcoming of the current doctrine.

Third, when the situation requires a deliberate assault river crossing, the U. S. Army should tailor the assault so that light infantry units supplement the mechanized infantry assault forces. Light infantry forces are extremely valuable during the initial stages of the assault. They can cross the river on a wide front in assault boats with some measure of

stealth. Once on the enemy bank, light infantry forces can eliminate certain enemy positions to facilitate the assault crossing and rafting operations of the mechanized forces. As the assault penetrates into the depths of the defense, light infantry forces, supplemented by anti-tank weapons, can block possible counterattack routes into the flanks of the mechanized forces. The temporary addition of these light infantry forces to the assault echelons of a mechanized infantry or armored division would counter the reductions in the numbers of dismounted infantry in the Army's spearhead divisions.

Fourth, a revised river crossing doctrine should stress the need for active, comprehensive reconnaissance prior to a deliberate assault crossing. The reconnaissance should be performed along both banks of the river to determine not only the river characteristics but, more importantly, the status of the enemy's defense. All across the battle areas, patrols should actively conduct reconnaissance operations to preclude compromising the time and place of the attack. Such active reconnaissance should uncover weaknesses and strengths in the enemy's defensive framework. With this information, commanders can accurately plan their operations to take maximum advantage of the enemy's vulnerabilities. The revised emphasis on reconnaissance would serve to reinforce the importance of this activity for river crossing operations.

Fifth, an increase must occur in the amount of bridging assets and number of amphibious vehicles available in the force structure. This force structure change is necessary to insure that commanders have the means available to cross their combat power quickly across the river. Sufficient quantities of bridging assets must be available well forward during river crossing operations so crossing forces can replace damaged materiel quickly.

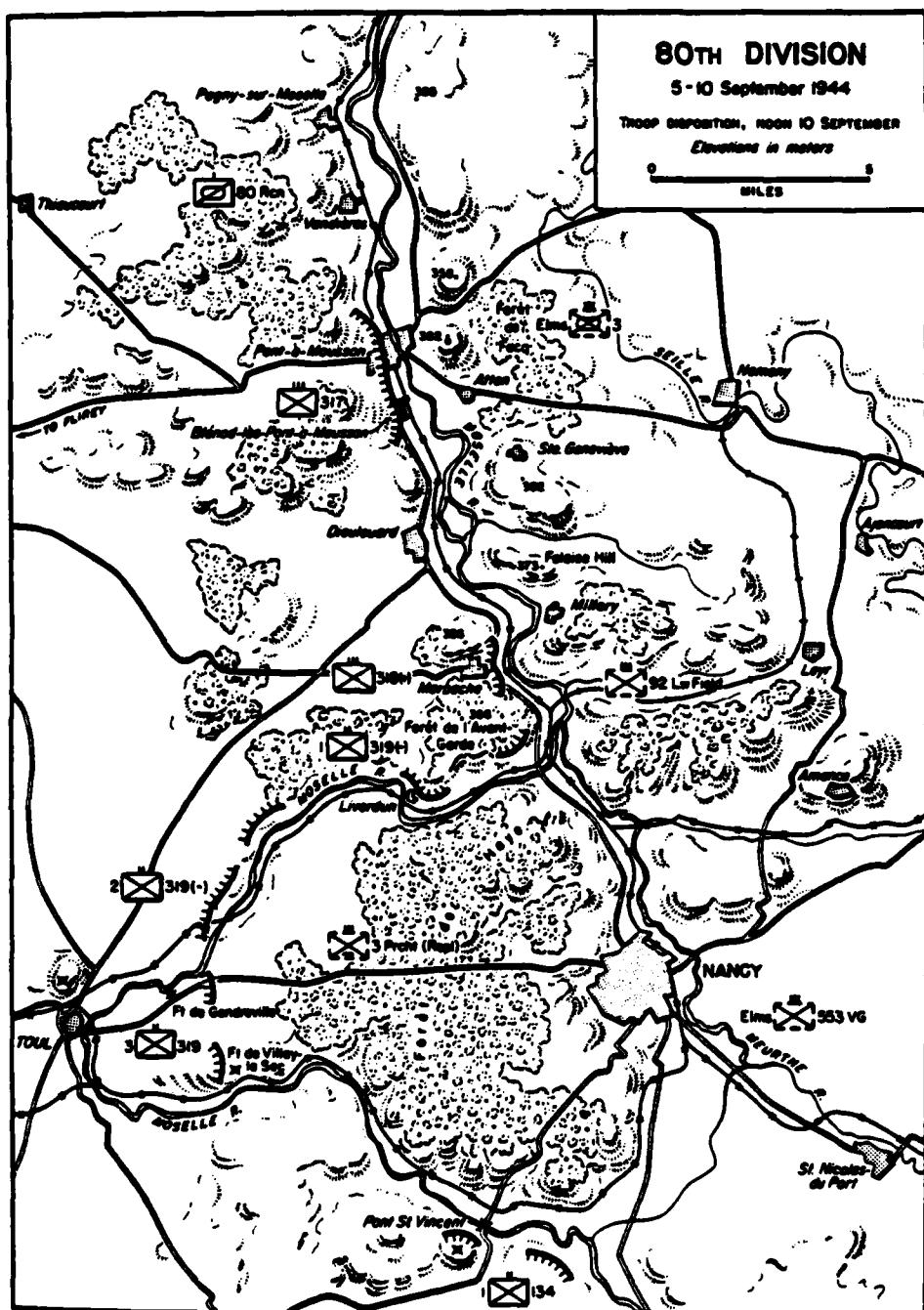
With this capability, assault force commanders will be more likely to risk bridge assets early in the operation when the threat of artillery damage is still high but when the early commitment of bridging assets will facilitate the rapid crossing of large quantities of tanks, artillery, and infantry fighting vehicles with which to attack the enemy's defenses. The presence of more amphibious vehicles in the force structure will further increase the force's ability to project combat power across rivers rapidly. The inclusion of additional amphibious vehicles and more bridging assets in the force structure will decrease the tendency to withhold the use of these resources until the bridge site is secure. Thus, the force commander will be able to eliminate one of the main factors retarding his rapid advance across the river.

Sixth, the U. S. Army must place much more emphasis on the concept of hasty river crossings. In the past, hasty river crossings or crossings of opportunity have occurred when fast moving forces were able to capture enemy bridges before their destruction. Current doctrine must continue to consider these types of crossings. However, we must also consider the possibility of rapid bridge construction during advanced stages of an attack to maintain the momentum of the attack. Attack planning should not use river lines as phase lines since such use tends to slow the crossing of the river. Attacking forces should strive to cross rivers as retreating forces are withdrawing across them. To facilitate this, planners must anticipate the need for river crossings and insure that appropriate river crossing assets are well forward in the attack column for expeditious use when required. By conducting river crossings in this manner, the U. S. Army may be able to avoid some of the problems discussed previously.

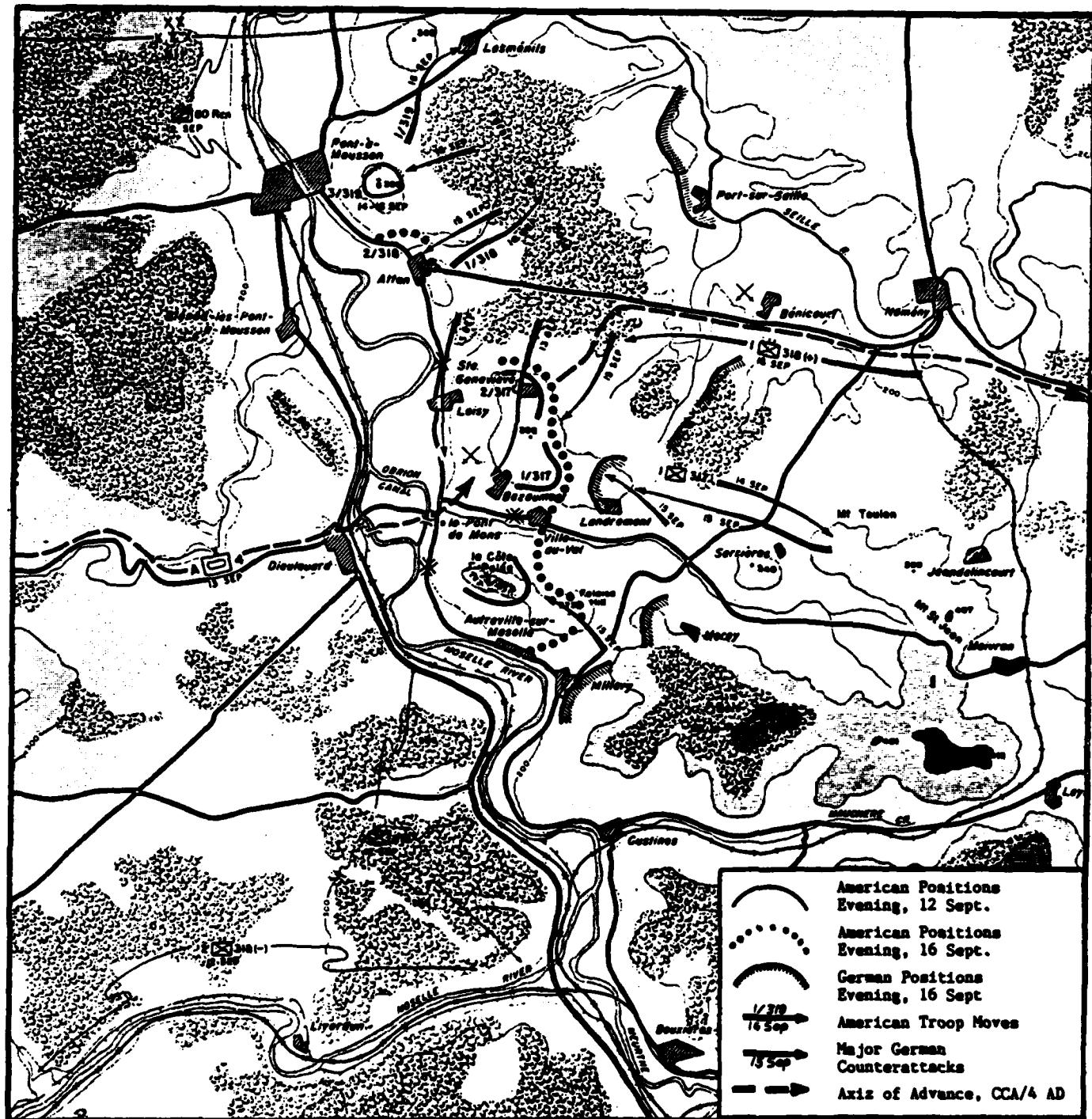
With the current U. S. Army force structure and the capabilities of the most likely opponent, the Warsaw Pact, this last change to the doctrine

appears to offer the best chance of success for future river crossing operations. The U. S. Army must be prepared, however, to conduct deliberate, forced river crossings should attempts at hasty crossings fail or the tactical situation demand a deliberate assault. To meet this requirement, the U. S. Army must revise its current river crossing doctrine to make it more compatible with the current force structure and the current battle doctrine. In addition, some force structure modifications are necessary to facilitate the workings of the revised doctrine. The current river crossing doctrine is no longer compatible with the U. S. Army's force structure and is not viable against the U. S. Army's most likely opponent, the forces of the Warsaw Pact.

**APPENDICES**



Appendix A: Map #1 - 80th Infantry Division's Sector Along the Moselle River. (H. M. Cole, The Lorraine Campaign (Washington, D. C.: U. S. Government Printing Office, 1950), Map No. 9).



Appendix B: Map #2 - 80th Infantry Division's Bridgehead On the Moselle River. (After H. M. Cole, The Lorraine Campaign (Washington, D. C.: U. S. Government Printing Office, 1950), Map No. 11).

**ENDNOTES**

## ENDNOTES

1. Sir Edward S. Creasy and Lt. Col. Joseph B. Mitchell, Twenty Decisive Battles of the World (New York: The Macmillan Company, 1964), p. 72.
2. H. M. Cole, The Lorraine Campaign (Washington, D. C.: U. S. Government Printing Office, 1950), pp. 57-105. Most of the details of the 80th Infantry Division's crossing of the Moselle River in September 1944, come from this reference. Other sources are cited as used.
3. Ibid., p. 79.
4. Lt. Col. George Dyer, XII Corps Spearhead of Patton's Third Army (Baton Rouge, La.: Military Press of Louisiana, Inc., 1946), p. 204.
5. Ibid.
6. Cole, p. 71.
7. Ibid., p. 142.
8. Martin Blumenson, Breakout and Pursuit (Washington, D. C.: Office of the Chief of Military History, 1961), p. 95.
9. Cole, pp. 71-72.
10. Ibid., p. 103.
11. Ibid., p. 149.
12. Ibid., p. 116.
13. Ibid., p. 97.
14. Blumenson, p. 98.
15. U. S. War Department, Military Intelligence Service, "Breaking the Siegfried Line," Tactical and Technical Trends, No. 57, April, 1945, p. 63.
16. Cole, p. 71.
17. Carl von Clausewitz, On War (Princeton, N. J.: Princeton University Press, 1976), p. 434.
18. Ibid., p. 533.
19. U. S. Army, Tentative Field Service Regulations, FM 100-5, Operations, (1939), para. 608, p. 209.

20. Ibid., para. 604-605, pp. 207-208.
21. Ibid., para. 615, p. 211.
22. Ibid., para. 605, p. 208.
23. Ibid., para. 617, pp. 212-213.
24. Ibid., para. 607, p. 209.
25. U. S. Army, Field Service Regulations, FM 100-5, Operations, (1944), para. 792, p. 227.
26. Ibid., para. 792, pp. 227-228.
27. Ibid., para 795, p. 229.
28. U. S. Army, Field Manual 90-13, River Crossing Operations, (1978), p. 1-2.
29. Cole, p. 103.
30. FM 90-13, p. 3-25.
31. U. S. War Department, Table of Organization and Equipment 7-11, Infantry Regiment, 26 February 1944, with Change 1 dated 30 June 1944.
32. U. S. Army, Field Manual 7-7J, The Mechanized Infantry Platoon and Squad (Bradley) (Final Draft), (undated), p. 2-4. Figure 2-5 in this draft manual depicts a mounted IFV team consisting of three personnel and a dismounted infantry team of seven personnel. U. S. Army, Table of Organization and Equipment 7-247J410, Mechanized Infantry Company (Bradley), 1 April 1985, reduces the size of the squad to nine personnel by deleting the machine gunner thus reducing the dismounted infantry team to six personnel.
33. After-Action Review, National Training Center, 20 October 1985.
34. Eddy Smith, Defeating Soviet Artillery (Fort Leavenworth, Ks.: MMAS Thesis, 1979), p. 69.
35. Cole, p. 96.
36. U. S. War Department, Field Manual 5-35, Corps of Engineers Reference Data, (1944), pp. 159-160. Blanche D. Coll, Jean E. Keith, and Herbert H. Rosenthal, The Corps of Engineers: Troops and Equipment, (Washington, D. C.: Office of the Chief of Military History, 1958), p. 204. Data from these two sources shows that U. S. Army Engineer units contained over 44,000 feet of heavy float bridging in World War II. This was supplemented by another 22,000 feet of light vehicular bridging. Current engineer bridge companies in divisions have only 144 meters of float bridging while corps bridge companies have 216 meters of float bridging. Simple calculations reveal how the number of bridging assets has declined.

37. Martin Blumenson, Bloody River (Boston: Houghton Mifflin Company, 1970), p.67.

38. The following three sources explain the importance of reconnaissance to the American Army, German Army, and Soviet Army, respectively.  
U. S. War Department, Office of the Chief of Staff, "Assault River-Crossing Experience in ETO," Operations Division Information Bulletin, Vol. IV, No. 4, 17 April 1943, p. 7.  
U. S. Army, DA Pamphlet 20-290, Terrain Factors in the Russian Campaign, (1951), pp. 19-24.  
Oberst a. D. Wilhelm Willemer, Large-Scale Russian River Crossings and German Countermeasures, Headquarters, United States Army Europe, Historical Division, undated, pp. 66-68.

39. The doctrine for each of these three armies required surprise as a factor for tactical river crossings. The American use of surprise has been discussed earlier in this paper. Willemer, pp. 76-89, discusses Soviet and, to a lesser extent, German surprise and deception operations.

40. Willemer, p. 219.

41. Dyer, pp. 180-184, discusses the rapid advance across France while Cole, p. 58, documents the fuel shortage.

42. Generaloberst Karl A. Hollidt, River Crossings by the Red Army in World War II, European Command, Historical Division, 1949. Both Hollidt and Willemer discuss Soviet river crossing operations on the Eastern Front in detail. There were elements of hasty crossings in virtually every major operation. DA Pam 20-290, pp. 17-27 discusses several hasty river crossings conducted by the German Army.

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